The Zuckerberg Caricature: The Stereotypical Genius Computer Scientist And Its Negative Effect on Corporate Behavior

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On my honor as a University Student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments

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Introduction

Modern tech companies undeniably have a powerful influence over both social structures and the world economy. The five largest tech corporations in America—the five "FAANG" tech giants (Facebook, Amazon, Apple, Netflix, and Google)—have a market cap of over 2.4 trillion dollars, approximately equal to the GDP of France (Fernando, 2022, p. 1). With this vast influence, concerns over how it is to be wielded are inevitable. Through issues of misinformation and dangerous and radicalizing content on social media platforms, many have called for increased regulation and accountability of tech corporations (Biden et al. v. Knight et al., 2021). Most Americans believe that social media and tech companies have too much influence on both society and politics (Anderson, 2020). In addition, almost three-quarters of Americans are not confident that tech and social media companies would be able to prevent misuse of their platforms to compromise the integrity of our presidential elections (Green, 2020). With such widespread influence and so little public confidence in their scruple, it is worth investigating the underlying mechanism that contributes to how tech corporations have become such autonomous entities.

Specifically, the personally held image of computer scientists is worthy of investigation as contemporary work indicates that personal image is closely related with behavior. Correlation between feelings of internal disagreement among an abstracted sense of identity and perceived self (known as the actual-ideal discrepancy) and anxiety has been well documented, illustrating that personal image and expectations of this image are integral to behavior and outlook (Falewicz et al., 2016). In this context, personal image refers to internal beliefs about one's identity, in contrast with expectations imposed on someone by an external party. For example, a professional welder may maintain a personal image of themselves as sensitive and emotionally expressive,

but this image stands in contrast to the social expectations of someone in their profession as traditionally masculine and stoic. This dichotomy may lead to an increase in the welder's anxiety, and serve to minimize the sensitive aspects of their personal image that they consider a part of their identity. Assuming this relationship holds true for the computer scientist, then the stereotypes surrounding CS professionals could be linked to the undesirable behavior of the big tech industry described above. A better understanding of how this image presents itself in corporate tech culture may provide insight into how the reprehensible behavior of the big tech industry arises. One approach to characterize this relationship is to explore documentation from companies that compose this industry. Through this documentation, one might identify the degree to which the traits that constitute the popular CS image are reflected. Through this paper, I will investigate the private identity of tech companies through internal documentation to draw conclusions about the presence of the stereotypical CS image in big tech.

Problem Description: Computer Science Identity is a Confounding Factor in Behavior

Many disciplines have commonalities or social expectations for the professionals within it, e.g., health care professions such as nursing are often associated with female gender stereotypes (*Effects of stereotypes on career choices*, 2022), but computer science, given its many depictions in media, has a most pronounced stereotype associated with it (Dou et al., 2020, p. 5). The image of a savant, locked away in a darkened room, face lit only by the pale blue glow of a computer monitor as they solve an unsolvable problem is littered throughout film and tv shows. Prominent examples include Jesse Eisenberg's depiction of Mark Zuckerberg in David Fincher's *The Social Network*, Elliot in Sam Esmail's *Mr. Robot*, and Q in *Skyfall* from the same director. Surveys of students and academic professionals find that in developing academics, people assume that computer scientists must be "very smart" (Wang et al., 2017, p. 51). Broader

surveys also find computer scientists and students of the subject routinely described and stereotyped as “singularly focused” or obsessive, “asocial,” “competitive,” and “male” (Lewis et al., 2017, 23). Stereotypes are not necessarily reflective of the average computer scientist, but these stereotypes do have an impact on who pursues and continues with a career in computer science. Studies relating students’ self-identification with common computer science stereotypes to their later pursuit of the field find that a stronger “fit” indicates a higher likelihood of a future pursuit of the subject (Lewis et al., 2017, 29). Given that students who exhibit or self-identify with computer science (CS) stereotypes such as the five mentioned by Lewis et al. will have a stronger sense of “fit,” then these traits are more likely to be represented in the CS demographic than the general population.

The commonality of strong asocial, competitive, and obsessive traits among those designing socially and fiscally influential technology can be reasonably inferred to have an effect on cooperation and transparency as design concerns. Asocial threats to a social organization have an adverse effect on cooperation (Barclay & Benard, 2020), thus a population composed of asocial individuals will be less inclined to cooperate, and consequently, less likely to behave with transparency. Reflected in Facebook’s “move fast and break things” motto, tech companies composed of those exemplifying obsessive, asocial, and competitive behavior are expected to operate with less accountability than an industry dominated by a population with a lesser display of these traits.

Contemporary Work in Stereotypes and Computer Science

Much of the current literature discussing the stereotypes of computer science approach the stereotypes to evaluate their effect on the demographic makeup of the collegiate and professional computer science community. Current investigations cover the effect of perceived

stereotypes on the gender makeup of computer science demographics, specifically how computer science stereotypes perceived as culturally masculine can serve as a barrier to entry for female programmers (Cheryan et. al., 2015). Similar investigations relate these same perceptions to the low percentages of racial minorities in the field of computer science (Dou et. al., 2020; Wang et al., 2017). In one investigation, various parties involved in K-12 education were interviewed regarding their perceptions of the professionals involved in computer science. When questioned as to the requirements for intelligence for these professionals, respondents answered overwhelmingly positively. Their responses are graphed below:

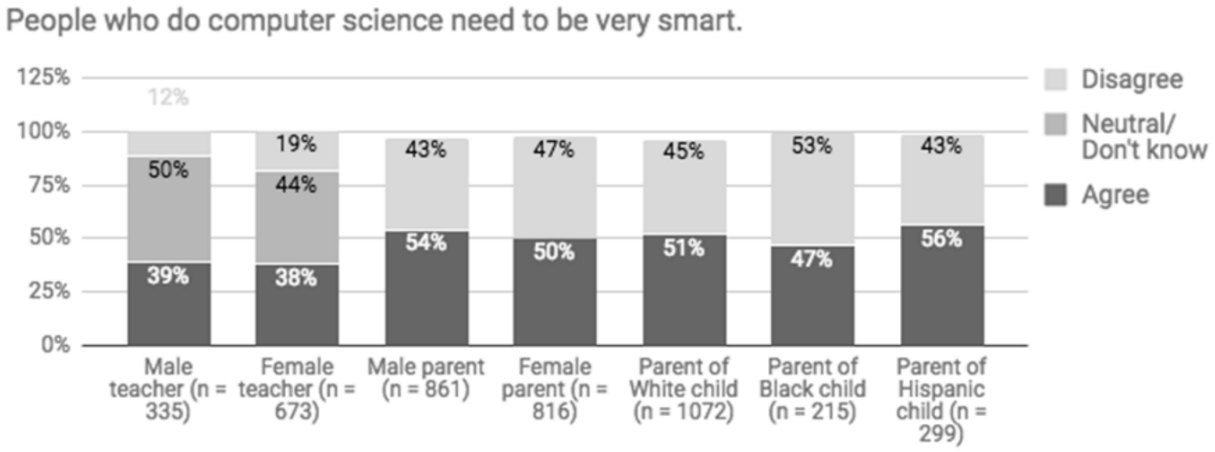

Figure 1: Perceptions of CS Professionals as Intelligent (Wang et al., 2017, p. 53)

We can see across racial and gender markers, students and teachers identify a requirement for computer scientists to be smart. This serves as evidence for the existence of a hyperintelligence trait associated with the CS identity in popular view.

There is also substantial literature identifying public perceptions of programming professionals, as well as investigations into corporate culture and its effects on performance (Lewis et. al., 2016; Kitchell, 1995). However, the causal relationship between cultural stereotypes of programming and the observed disreputable behavior of tech corporations is not

well defined in contemporary work. The effect of these stereotypes on the demographic makeup has been investigated, but their association with internal corporate attitudes and the private behavior of tech companies remains largely unexplored. While establishing a direct link between the nuanced psychology of stereotypes and the motivations of entire corporations is beyond the scope of this paper, we can provide a better understanding of the degree to which tech corporations exhibit the traits associated with the public image of the stereotypical computer scientist. Using the tech giant Facebook as a case study, we can identify an acute example of this principle in the hopes of illuminating the larger trend within its industry. Through an analysis of internal documents and policies leaked from Facebook, we can establish the degree to which stereotypical CS characteristics are exemplified. By demonstrating how these documents and policies exemplify stereotypical characteristics, we can create a more complete picture of Facebook's relationship with the CS image, and through Facebook, the industry as a whole.

Methods: Uncovering Reflections of CS Stereotypes in Behavior

Identifying the Most Relevant Traits of the Stereotypical CS Image

Before the reflection of the CS image can be investigated, the main traits comprising the image must be identified.The sources of individual conceptions of computer scientists have origins in media, and other cultural depictions, but it can be reasonably inferred that individual experiences, personal relationships, and observations shape views of the discipline (Ensmenger, 2015). The differences in these sources can ostensibly lead to variety in the traits identified to define the discipline of computer science depending on the subject identifying them. However, there are overarching themes that transcend this individual variation, which will be the focus of this analysis.

One noteworthy trait often exemplified (and even satirized) in media is

hyperintelligence. This expectation of hyperintelligence in computer science is reflected in survey-based data surrounding students considering pursuing computer science, as discussed in Part I (Wang et. al 2017). Intelligence is difficult to quantify, but in this context we will use it to refer to an unaided technical proficiency rather than a more non-behavioral metric like IQ.

In addition to the hyperintelligence described above, to identify additional qualities relevant to our analysis, I will primarily consult a study conducted to investigate the motivations of university students deciding to major in computer science by Lewis et. al., 2016. The data collection for this investigation took the form of interviews with students enrolled in introductory CS courses at a sample of public universities. While there are limits of the conclusions that can be drawn from sampling only within this demographic, it is still reasonable to apply these findings for the purposes of this research paper as the vast majority of computer science professionals hold bachelor's degrees (Zippa, 2019). In the various interviews conducted, the researchers found the following traits most prevalence across sessions:

Singularly focused: Computer scientists are perceived as fixating on the work demanded of their profession, and shirking other responsibilities or hobbies. In the interviews, this manifested as excessive time spent in front of a computer monitor, avoidance of sleep or food in favor of work, or isolating in university labs. In the professional world, the manifestations of this trait may appear different, but the hyperfixation and quality of singular focus is the quality of interest.

Asocial: Computer scientists are perceived as isolationist, preferring to work alone, and avoiding assistance or collaboration. Students interviewed illustrated this perception through descriptions of their individual experience, describing the social interactions in their programming classes in contrast with other disciplines as muted or lacking. Qualitatively, the

interviews also illustrated a general perception of computer science students as introverted, struggling with group projects and casual interactions.

Competitive: CS professionals and students are perceived as competitive, eager to outperform colleagues and improve their relative standing. In interviews from Lewis et. al., this quality was depicted through student relationships with "weed-out" classes and testimonials of the competitive nature of the discipline. Competition can be fostered through the structure of the institution in which actors are competing. Therefore, we will discuss the competitive nature inherent in individuals as well as the structure that may cultivate it in the quality of competitiveness.

Male: CS as a profession is perceived as male dominated, both in demographic and embodiment of masculine qualities. In student interviews, the demographics were highlighted frequently, as the gender disparity between men and women is visible. Notably, however, one student testimonial spoke about a perceived skill gap between men and women, citing the disparity between men and women as CS teacher's assistants (TAs) as evidence that men outperform women in CS classes. This notion that gender demographics can influence perceived technical proficiency reinforces the social conditioning that more "male" individuals are perceived as valid in the CS field. The process by which the CS domain adopted a more masculine image through cultivation of "individual artistic genius, personal eccentricity, antiauthoritarian behavior, and a characteristic 'dislike of activities involving human interaction'" is complex, and developed alongside the field of CS (Ensmenger, 2015, p. 38).

While the "male" quality, whether that be simple gender demographics or traits traditionally associated with masculinity, is undoubtedly present in the image of CS, the nuance of the gender binary and its implications on behavior and self conceptions are beyond the scope

of this investigation. We will thus omit the "male" quality from evaluation in this context. In addition, the trait of hyperintelligence shares many behavioral characteristics indicative of singular focus, and thus can be discussed together. Therefore, the characteristics of interest for further analysis in the corporate tech sphere will be asociality, competitiveness, and singular focus.

Describing the Relationship Between Image and Corporate Behavior: Mesthene's Balance of Private and Public

In order to analyze the private behavior of a corporation and the public perception of CS professionals, the interaction between private and public domains outlined by Mesthene's *Technological change: Its impact on man and society* is a useful organizational tool (Mesthene, 1970). Mesthene describes the organizational domain of sociotechnical systems as misunderstood and shrouded in ignorance as there is no comprehensive way of describing it. The organization domain is then explained as a growth process of increasing scale as a technology develops, leading to increased involvement of human actors. The increasing scale and thus introduction of new, interested parties is shown below:

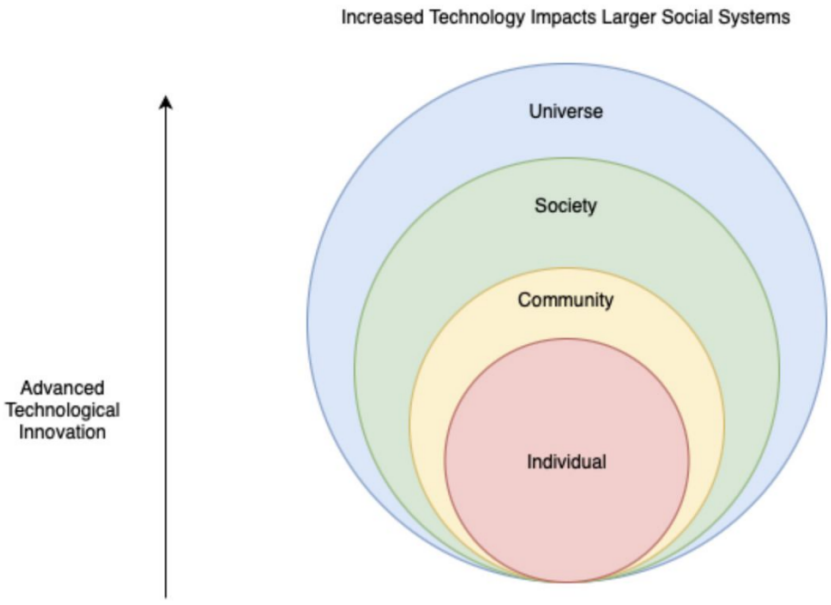

Figure 1: Required Increase in Social Impact as Technology Develops (Gibson et al., 2020)

A system begins at the individual level. In the production of a technical product, this would be an entrepreneur. This individual then expands in scope to a community, possibly in the form of added team members. As the technology gains consumer base and influence, society may become aware or concerned. This social influence constitutes a larger social system for the relevant technology. Eventually, the universal scale may become relevant, as a product or innovation modifies its environment in a significant way, beyond the societal scale.

As a sociotechnical model, the domains discussed by Mesthene can be used to better understand the development of a sociotechnical system through the lens of its public and private components. As a process, this entails identification of the private and public aspects of the system, developing a method by which these categories can result in a more productive view of the system, illuminating the evolution and growth of these aspects, and identifying the impact of this growth and evolution on the individual.

In the case of corporate tech and their relationship with stereotypes, the public and

private domains of the system can be abstracted beyond categories of stakeholders to classification of different conceptions of the composition of the tech company at hand. For the investigation of Facebook through analysis of internal attitudes and policies, the most relevant public domain encompasses the stereotype of the computer science professional. Stereotypes are constructed through public opinion, and as we have seen through Wang et. al. 2017 and Lewis et. al. 2016, this public image can in turn influence behavior. We can thus adopt Mesthene's public domain to be the characteristic traits of the CS image displayed by professionals within the tech company of interest. Organizationally, the public domain in this context will describe both how individuals and tech companies put forth a persona for the public, and the image or persona that the general public actually perceives. While the image or persona perceived is primarily characterized by the singularly focused, asocial, and competitive traits we have identified, the persona put forth may differ, and both exist within the public domain.

Conversely, we can use Mesthene's private domain to categorize the internal attitudes of both individuals and companies. For individuals, this may take the form of privileged conversations between people expressing attitudes not intended for professional superiors or the public. For companies, this may take the form of internal memos, company policies, and other materials not intended for public release. In either case, relating these domains through the process dictated by Mesthene will allow us to understand their interaction, and the effect of that interaction on the system as a whole.

Results: Traits Present in the Stereotype of CS Manifest as Corporate Policy and Culture

Relevant Identified Stereotypical Traits Portrayed in Corporate Tech: Facebook (Meta) as a Case Study

In the corporate "Big Tech" sphere, Meta (Formerly, and for the purposes of this paper,

Facebook) is a giant amongst its peers, and a cultural reference for Silicon Valley (Caers et al., 2013). Facebook boasts an active user count approaching 3 billion, and captures the most time per day for American users of any social media platform. (*Meta Earnings Presentation Q3 2022*, 2022). In October of 2021, a slew of internal Facebook documents were leaked, dictating Facebook corporate practices, guidelines, and self-awareness of Facebook's influence and harm (Lima, 2021). The aggregate of these leaks has become known as the Facebook Papers. These documents dictate practices, behaviors, and attitudes which embody many of the traits we have identified with the stereotypical image of computer science professionals (Rodriguez, 2019).

One such practice is the basis by which many Facebook employees are evaluated. Twice a year, Facebook employees are provided "peer feedback" known internally as "Calibration Meetings" in which employees are given a categorical description of their performance. Notably, each category is associated with a recommended fraction of employees to receive each grade. This recommendation of fractional grade distribution naturally leads to a notion of relative grading, meaning employee performance is dictated by performance relative to peers. The recommended grade distribution for each category is tabulated below:

Performance Descriptor	**Fraction of Employees (%)**
Redefine	Less than 5%
Greatly Exceeds Expectations	10%
Exceeds	35%
Meets All	35-40%
Meets Most	10-15%
Meets Some	0-5%
Does Not Meet	Rare

Table 1: Employee Performance Descriptors by Frequency (Table Created by Author)

The bottom three grade categories are described as putting future employment in jeopardy, while the bottom two indicate imminent termination. The meetings in which these grades are assigned occur biannually, such that they exist in the forefront of employees' minds.

This process embodies the competitiveness trait, as relative grading encourages increased performance *relative to peers*. One is motivated to perform better than those around them, as if they should fail to, their career could be in jeopardy. This policy, enacted by Facebook, demonstrates a preference towards competition, and discouragement of collaboration. The success of a coworker could result in an inferior rating for yourself. In Mesthene's framing, we can categorize this competitive policy as a private aspect of the Facebook system, which in turn affects the public behavior of individual employees. The public behavior of employees referenced here exists within the professional workplace, and may exist as separate from an alternate "public" behavior beyond the professional setting. Employee behavior in a professional context, however, is the relevant public domain for this system.

Individual testimonies released with the Facebook Papers have also discussed imperatives from Facebook management. Former employees describe management providing all major decisions, and fostering an environment where "employees are discouraged from voicing dissent" (Rodriguez, 2019). Discouragement of dissent and critical discussion of corporate decisions serves to quash discourse, and reflects the manifestation of the trait of asociality within Facebook's private persona. The communication of employees is restricted through the discouragement of dissent, fostering an environment of limited employee interaction. Limiting employee interaction inherently decreases the social quality of Facebook's private, internal culture, and thus reflects the asocial characteristic we see in the stereotypical public CS image. Here, we again see the interaction between the private aspect of the Facebook system and the

public personas of individual employees.

In the wake of the Facebook Papers, several employees expressed discontent via interviews with the prejudice and negative feedback levied against those with personal commitments outside of work (Rodriguez, 2019; Lima, 2021), Interviews revealed that those with personal commitments face social ostracism and inflexibility from management. This attitude illustrates an emphasis on the "work" portion of the "work-life balance" in Facebook's culture, and demonstrates the existence of the singular focus characteristic within Facebook's private domain. Hyperfixation is the natural consequence of responsibilities and interests beyond the professional being discouraged.

Each of these policies or cultural behaviors enacted by Facebook illustrates a trait identified within the stereotypes of computer science professionals. For convenience, the highlighted behaviors and their demonstrated trait(s) in the CS image are tabulated below.

Trait	Behavior
Singular Focus	● Discouragement of Personal Priorities
Asociality	● Removal of Individual Voice ● No Dissent Culture
Competitiveness	● Calibration Meeting Frequency ● Grading Scale

Table 2: Traits Exemplified by Facebook Policies (Table Created by Author)

The reflection of the traits associated with the stereotypical computer scientist in Facebook's policies and behaviors indicate a constructive relationship between the public image of a computer scientist and the private behavior of a corporation. This is not to say that this is a positive relationship, but to say that the public perception of the individuals within the tech industry shapes private presentation of these companies; on some level the stereotypical CS image informs the private behavior of corporations like Facebook. This mutual shaping is the

mechanism by which the stereotypes of the CS sphere lead to irresponsible and unaccountable behavior by tech corporations. Preconceptions of CS professionals exist in social discourse and media. The process of pursuing further CS education then favors those who identify with these preconceptions, leading to a population of computer scientists who are even more inclined to proliferate the already existing stereotypes of the profession than those before them. The result is a positive feedback loop. In analysis of the traits most frequently associated with CS professionals, I have found asociality, hyperfixation, and competitiveness most ubiquitous. Through Facebook as a case study, we see that corporate policy and culture within the tech sphere reflect all three of these traits. This serves as evidence of the feedback mechanism at work in Facebook's population.

Conclusion

As the tech industry has expanded into the public domain, qualities expected from the engineers composing the product development of this field have permeated the culture and psyche of the field itself. In the case of Facebook, the established traits associated with the stereotypical computer science profession can be seen reflected in corporate policy and company practices. We see in the evaluation process of employees, interemployee competition is not only encouraged, but expected for favorable evaluation. The pattern of isolationism and asociality expected of computer scientists is reflected through policy and attitudes suppressing employee dissent and critical discussion. The reported company attitude discouraging personal pursuits exists in parallel to the trait singular focus; hyperfixation on the academic work associated with their computer science profession is to be made the priority. The trait of hyperintelligence interpreted as extreme technical proficiency can be seen in Facebook's selective recruiting processes. Each of the traits identified as the primary characteristics associated with the

stereotypical computer scientist is represented in this case study. This representation constitutes evidence of an influential relationship between the stereotypical CS image and corporate tech policy and culture.

While the case study demonstrates the existence of the CS image in Facebook's policy and culture, broader implications may require additional information to confirm. Further investigation is required to establish a causal relationship between the CS social image and corporate tech behavior as a whole, and more still to understand the mechanism by which this relationship functions. With these limitations in mind, the implications of these results do reach beyond Facebook. One can infer that other players in the tech industry are affected by the same dynamic of CS image reflection demonstrated in the Facebook case study, as Facebook is an industry leader, and constitutes a significant portion of the big tech space (Caers, 2013). The implications of this effect reach beyond the tech industry to social discourse as a whole; since the primary attributes associated with the image of computer scientists permeates into tech culture, awareness of this image's construction is vital.

A more developed knowledge of the extent to which CS stereotypes infiltrate tech industry culture is relevant to those who have significant influence on the construction of CS stereotypes. This includes educators, who may be able to incorporate activities which cultivate collaboration and communication, while emphasizing well roundedness, to combat the traits of competitiveness, asociality, and hyperfixation. This also includes media producers, such as filmmakers, who include depictions of CS professionals. They might consider these depictions, and how they include these primary traits, as the inclusion of these traits can contribute to the image they are depicting. If we as a society value the reflection of collaborative social values in our tech industry, we need to consider how our views of the individuals comprising the industry

are reflected in its culture.

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